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Antimicrobial activity of the methanolic extract and compounds from *Morus mesozygia* stem bark

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ABSTRACT

Aim of the study: This study was aimed at investigating the antimicrobial activity of the methanolic extract (MMB) and compounds isolated from the stem bark of *Morus mesozygia*, namely 3β-acetoxyurs-12-en-11-one (**1**), moracin Q (**2**), moracin T (**3**), artocarpesin (**4**), cycloartocarpesin (**5**), moracin R (**6**), moracin U (**8**), moracin C (**9**), and moracin M (**10**).
Materials and Methods: The liquid microdilution assay was used in the determination of the minimal inhibitory concentration (MIC) and the minimal microbicidal concentration (MMC), against nine bacterial and two fungal species.
Results: The results of the MIC determination showed that the compounds **3**, **4**, **8** and **9** were able to prevent the growth of all tested microbial species. All other samples showed selective activities. Their inhibitory effects were noted on 90.9% studied organisms for the crude extract, 81.8% for compound **6**, 72.7% for compound **10**, 63.6% for compound **1**, 54.5% for compound **5**, and 45.5% for compound **2**. The lowest MIC value of 39 μg/ml was obtained with the crude extract against *Escherichia coli*. The corresponding value for compounds (5 μg/ml) was registered with compound **9** on *Shigella dysenteriae* and compound **3** on E. coli, S. dysenteriae, *Pseudomonas aeruginosa*, *Salmonella typhi* and *Bacillus cereus*. The lowest MIC value (39 μg/ml) observed with the crude extract (on *E. coli*) was only eightfold greater than that of gentamycin used as reference antibiotic (RA) while the corresponding value (5 μg/ml) recorded with compounds **3** and **9** was equal to that of RA on the corresponding microorganisms.
Conclusions: The obtained results highlighted the interesting antimicrobial potency of *M. mesozygia* as well as that of the studied compounds, and provided scientific basis for the traditional use of this species.

1. Introduction

All over the world, people depended on herbs for the treatment of various ailments before the advent of modern medicine. Medicinal plants constitute an arsenal of chemicals that could be exploited by human to prevent microbial invasion. They have been a major source for drug development. Plant extracts and products are used in the treatment bacterial, fungal and viral infections (Bruneton, 1999; Cowan, 1999). Plants species of the family Moraceae has been reported for their antimicrobial potentials (Mandal and Kumar, 2002; Kone et al., 2004). Within this family, species of the genus *Morus* have also been reported to possess antimicrobial potency. *Morus* or Mulberry is a genus of 10–16 species of deciduous trees native to warm, temperate, and subtropical regions of Asia, Africa, and America, with the majority of the species native to Asia (nine in China). *Morus mesozygia* (black mulberry) is a small to medium sized forest tree of Tropical Africa. Its leaves and fruit provide food for the *Mantled Guereza*, a colobus monkey native to much of Tropical Africa, and for the common chimpanzee of West and Central Africa (Fashing, 2001). In traditional medicine the aqueous maceration of the stem bark of *M. mesozygia* is used to cure arthritis, rheumatism, malnutrition, debility; pain-killers, stomach disorders, wound infections, gastroenteritis, peptic ulcer and varieties of infectious diseases (Burkill, 1985; Noumi and Dibakto, 2002). This

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explains why this study was designed to evaluate the antimicrobial activity of a polar extract (methanol extract) and compounds from *M. mesozygia*.

2. Material and methods

2.1. Plant material

The stem bark of *M. mesozygia* Stapf. was collected in Yaoundé, in the Centre Province, Cameroon, in June 2007, and identified at the National Herbarium were a voucher specimen was deposited under the reference number 4228/SRFK.

2.2. Extraction and isolation

The air-dried stem barks (2 kg) of *M. mesozygia* Stapf. were powdered and macerated in methanol at room temperature for 48 h. The filtrate was evaporated under vacuum to yield a dark crude extract (MMB; 25 g). Part of the crude extract (20 g) was subjected to column chromatography (CC) on silica gel (200–300 mesh), eluted with hexane and ethyl acetate in increasing polarity, and the fractions were combined according to the analytic thin layer chromatography (TLC) to give eight fractions. Fraction I (hexane–ethyl acetate 9/2; 2.5 g) was re-subjected to CC on silica gel (200–300 mesh) [eluted with hexane–ethyl acetate (95/5, v/v)]

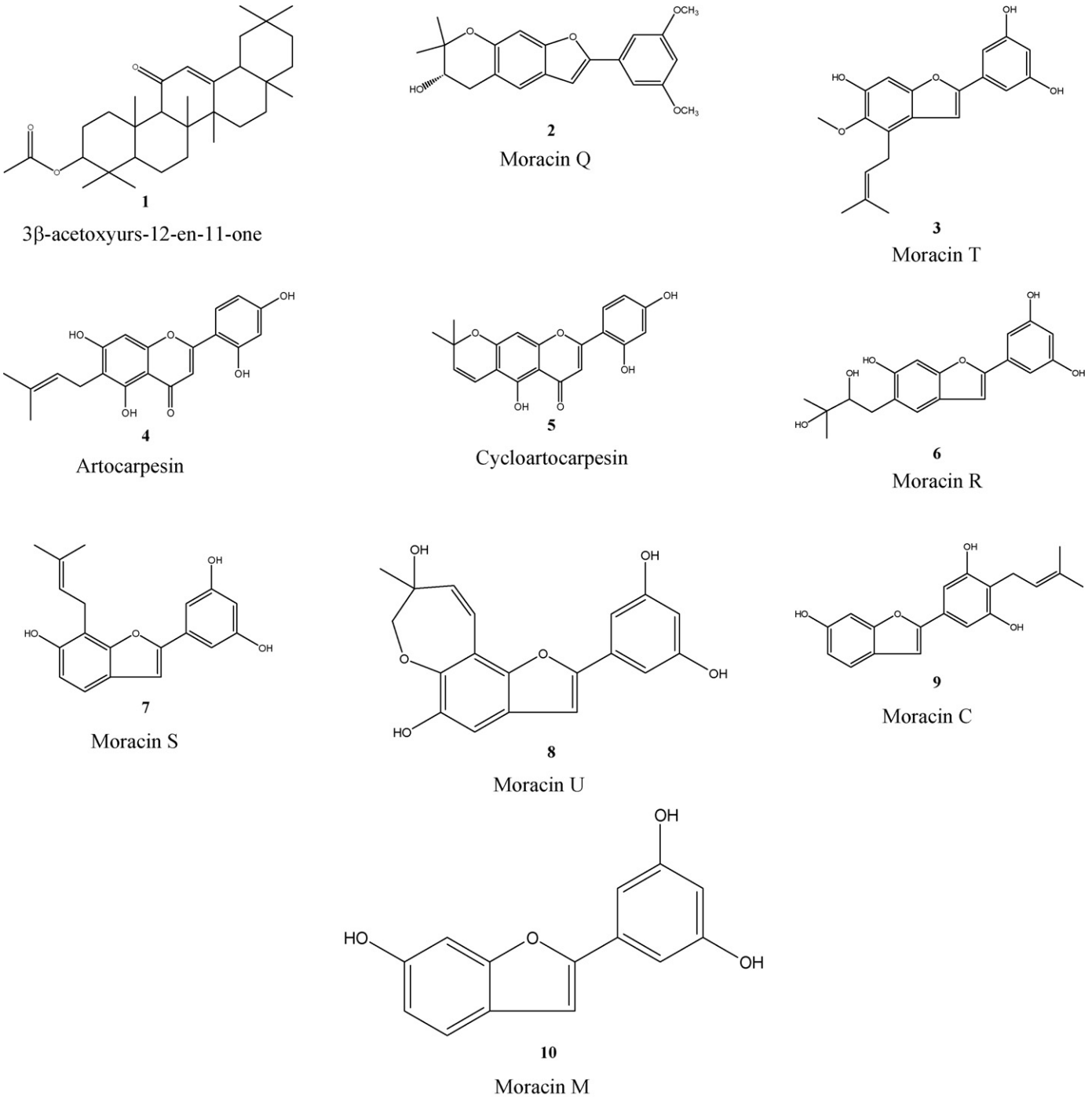

Fig. 1. Chemical structures of compounds isolated from *Morus mesozygia*.